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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

CHAUDHRY, SAEED T

ART UNIT

PAPER NUMBER

1746

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

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Office Action Summary	Application No. 10/636,028	Applicant(s) BASCERI ET AL.	
	Examiner Saeed T. Chaudhry	Art Unit 1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 16-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☒ Claim(s) 1-23 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

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DETAILED ACTION

Applicant's amendments and remarks filed March 1, 2006 have been acknowledged by the examiner and entered. Claims 1-23 are pending in this application for consideration.

Election/Restriction

Restriction to one of the following inventions is required under 35 U.S.C. 121:

Group I, Claims 1-15, drawn to a method of cleaning a processing chamber by contacting the inside of the chamber walls with supercritical fluid of C_3H_8 , C_2H_6 , or CH_4 , classified in Class 134, subclass 1.3.

Group II, Claims 16-23, drawn to a method of removing deposited material from internal surfaces of a processing system having a deposited chamber with a processing reagent inlet; a cleaning inlet; a cleaning agent source; a cleaning agent recovery vessel and a return line to recycle and contacting carbon dioxide in liquid phase or supercritical phase, classified in Class 134, subclass 10.

Inventions I and II are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the different inventions group I, claims 1-15 do not requires a processing reagent inlet or a return line to recycle or carbon dioxide in liquid phase or supercritical phase and group II, do not requires supercritical fluid of C_3H_8 , C_2H_6 , or CH_4 .

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, have acquired a separate status in the art because of their recognized divergent subject matter, the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

During a telephone conversation with Ms. Jennifer J. Taylor on March 29, 2007 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-

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15. Affirmation of this election must be made by applicant in responding to this Office action. Claims 16-23 are withdrawn from further consideration by the Examiner, 37 C.F.R. § 1.142(b), as being drawn to a non-elected invention.

Joint Inventors

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 C.F.R. § 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a diligently-filed petition under 37 C.F.R. § 1.48(b) and by the fee required under 37 C.F.R. § 1.17(h).

The Abstract

The Abstract of the Disclosure is objected to because it is directed to a method of removing deposited material by carbon dioxide instead of cleaning with super critical fluid of C_3H_8 , C_2H_6 , or CH_4 . Correction is required. See M.P.E.P. § 608.01(b).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
- (c) he has abandoned the invention.
- (d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States.
- (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.
- (f) he did not himself invent the subject matter sought to be patented.
- (g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not

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only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

Claims 1-4, 6-7, 9-15 are rejected under 35 U.S.C. § 102(b) as being anticipated by McCullough et al.

McCullough et al (5,908,510) disclose a method for the removal of residue from an etched precision surface by contacting the surface in a processing chamber with a supercritical fluid CO₂ under appropriate conditions that are sufficient to remove the residue from the surface. The term supercritical fluid refers to the state of matter of a material above its critical point, i.e., a critical temperature, T_c, and critical pressure, P_c, at which two phases of a substance, in equilibrium with each other, become identical, forming one phase. Any supercritical fluid known to those skilled in the art such as CO₂ and/or Ar may be used in the present invention provided that they are capable of removing the RIE residue from the semiconductor sample. The preferred supercritical fluid is CO₂ which may be used alone or in an admixture with one or more additives selective from the group consisting of Ar, N₂ O, NH₃, N₂, CH₄, C₂H₄, C₂ H₆, H₂O, n-C₃H₈, and the like.

It is also emphasized that the supercritical fluid could be combined with additives or surfactants which would aid in removing the RIE residue from the semiconductor sample. Suitable additives include, but are not limited to, those mentioned hereinabove. Of these additives, H₂O is most particularly preferred.

Typically, in the present invention the pressure within the process chamber during RIE residue removal is from about 1000 psi to about 6000 psi. More preferably, the pressure within the process chamber during RIE residue removal is about 3000 psi. The temperature within the processing chamber during the RIE residue removal which is monitored by thermocouple 26

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and controlled by controller 32 is generally from about 40° C. to about 80° C. More preferably, the temperature within the process chamber during RIE residue removal is about 40° C (see col. 5, lines 1-67 and abstract) .

The reference does not specify cleaning the walls of the chamber but since the supercritical fluid is contacted with the walls of the chamber. Therefore, the super critical fluid inherently remove any residue on the walls or the substrate support. McCullough et al disclose all the limitations as claimed herein. Therefore, the reference anticipated the claimed method.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made

The factual inquiries set forth in *Graham v. John Deere Co.*, 148 USPQ 459, that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or unobviousness.

Claims 5 is rejected under 35 U.S.C. § 103(a) as being unpatentable over

McCullough et al in view of Chen et al.

McCullough et al were discussed supra. However, the reference fails to disclose plasma chamber, CVD chamber and PECVD chamber.

Chen et al (5,356,478) disclose a method for removing residues previously formed in a plasma chamber by dry etching layers such as photoresist, barriers, etc. It is conventional to dry etch a stack of thin layers which can include photoresist (for patterning the underlying layers), an

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anti-reflective coating, aluminum, and a barrier material. Such etching, however, results in residues or deposits building up on surfaces inside the plasma treatment chamber (see abstract and col. 1, lines 11-37). Chen et al fails to use supercritical fluid for cleaning the residue from the walls of the chamber.

It is well known in the art to clean the plasma chamber after processing substrate as disclosed by Chen et al. Therefore, it would have been obvious to utilize the supercritical fluid as disclosed by McCullough et al for removing inorganic and organic material in the plasma chamber for removing the residue since super critical fluid are known to remove residue faster and efficiently. Furthermore, one of ordinary skill in the art would expect that same process would remove residue from the surfaces of CVD and PECVD chambers.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over McCullough et al in view of Biberger et al.

McCullough et al were discussed supra. However, the reference fails to disclose flowing a gas into the chamber and generating supercritical fluid from the gas with the chamber.

Biberger et al (8,060,422) disclose a method for supercritical processing a work piece by introducing a gas in the processing chamber and increasing the pressure and temperature of the chamber to generate the gas into supercritical fluid (see col. 6, line 50 to col. 7, line 55).

It would have been obvious at the time applicant invented the claimed process to incorporate the cited steps of introducing the gas into the processing chamber and generate the gas into the supercritical fluid as disclosed by Biberger et al into the process of McCullough et al because all the references are removing residue from the surface and providing super critical

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fluid before introducing into the chamber or generating the gas into the supercritical fluid in the chamber would have given the same results as well known in the art.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Saeed T. Chaudhry whose telephone number is (571) 272-1298. The examiner can normally be reached on Monday-Friday from 9:30 A.M. to 4:00 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Michael Barr, can be reached on (571)-272-1414. The fax phone number for non-final is (703)-872-9306.

When filing a FAX in Gp 1700, please indicate in the Header (upper right) "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communication with the PTO that are for entry into the file of the application. This will expedite processing of your papers.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (571) 272-1700.

Saeed T. Chaudhry
Patent Examiner



MICHAEL BARR
SUPERVISORY PATENT EXAMINER